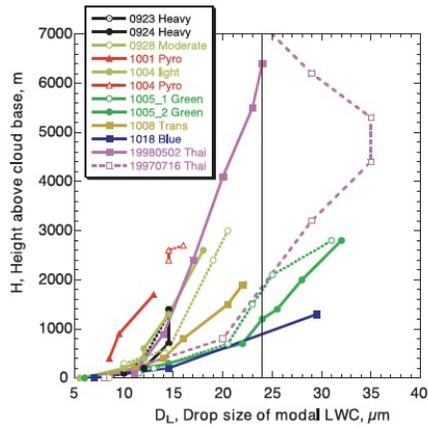


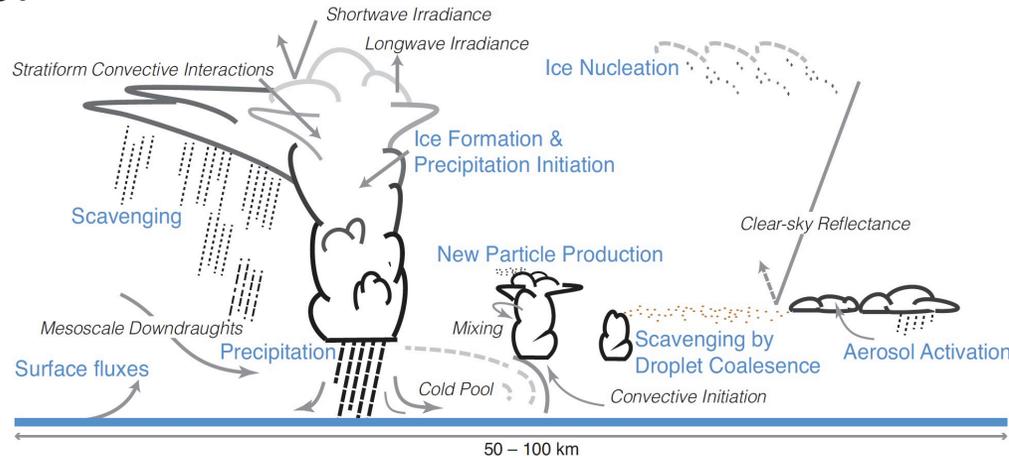
Aerosol Processes in Deep Convection: Discovery to Parameterization

M. Dubey, J. Fan, J. Smith, and C. Cappa

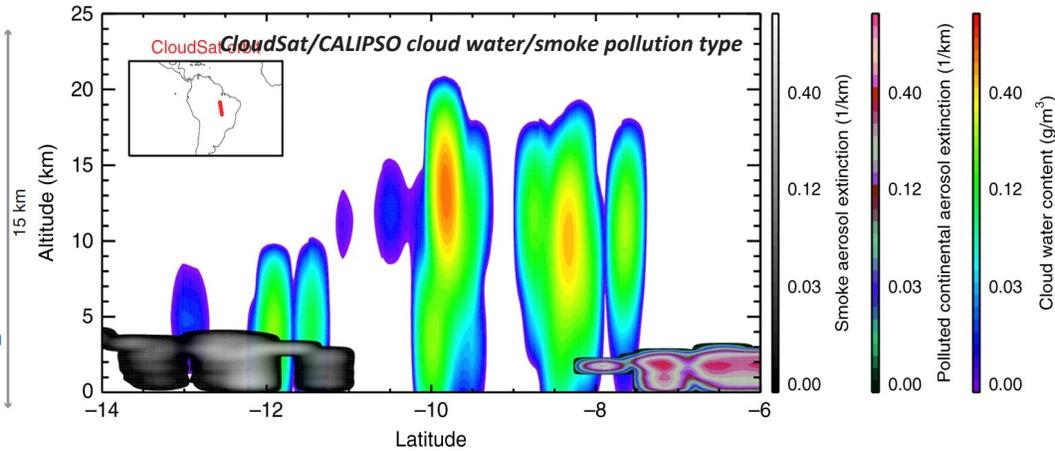
Smoke suppresses rain & invigorates storms: Andrea Science 2004



IPCC AR5 Conceptual deep convection in GCMs, 2014



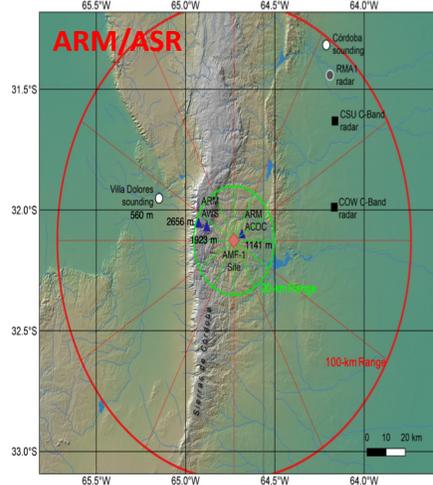
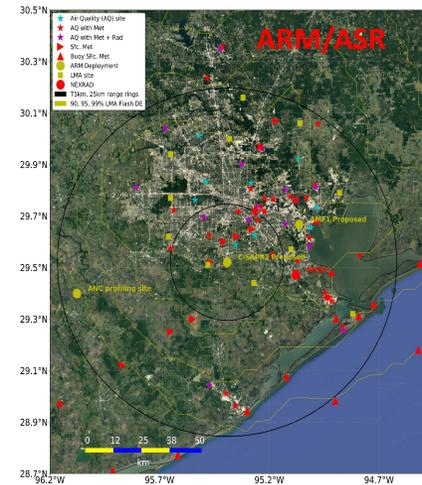
Contrasting effects on deep convective clouds by different types of aerosols: Jiang NatComm 2018



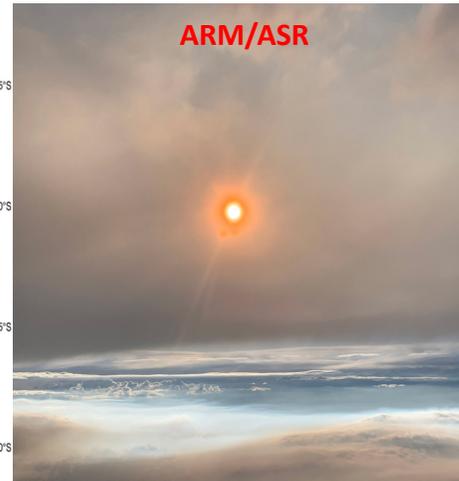
2004

2022

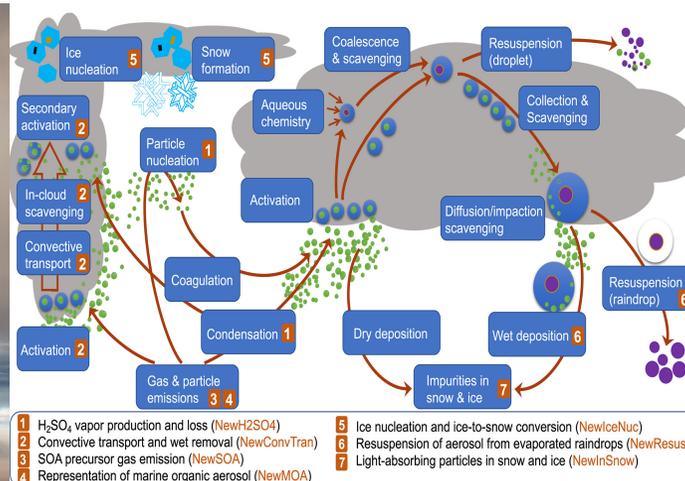
CACTI-18 to TRACER-22: Clean (oro.) to Dirty (coastal)



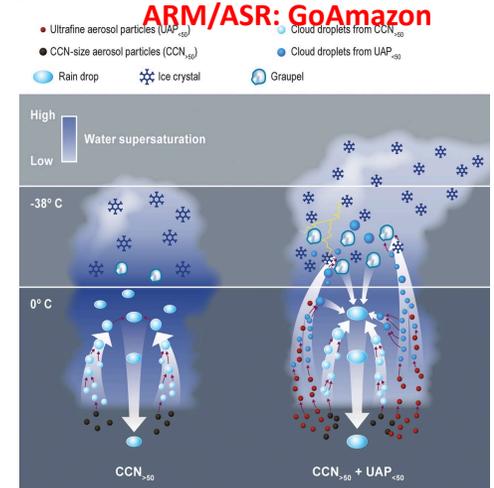
Fires to PyroCb: BBOP, LASIC, ORACLES, WeCAN & FIREX



Aerosols in E3SM: Wang JAMES 2019
EESD: E3SM-ASR/ARM-EAGLES/SCREAM



Convection enhanced by ultrafine particles: Fan Science 2018
ARM/ASR: GoAmazon



- **AGENDA:**

- **Sue van den Heever**, *Model-data framework for aerosols impacts on deep convection (15 min)*
- **Pengfei Yu**, *Efficient In-Cloud Removal of Aerosols by Deep Convection (6 min)*
- **Jiwen Fan**, *Aerosol impacts on convection and precipitation - from Amazon to Houston (6 min)*
- **Joel Thornton**, *Using lightning enhancements to identify aerosol effects on deep convection (6 min)*
- **M. Dubey**, *Large SOA Formation by Vapor Condensation in PyroCb outflow in LES Simulations & in situ Airborne Data (6 min)*
- **Sonia Lasher-Trapp** and T. Ross, *Aerosol Effects on Deep Convection through Influences on Cold Pool Production (6 min)*
- **Chris Cappa**, *Impact of water uptake on aerosol light absorption and implications for atmospheric stability (6 min)*
- **Raymond Shaw**, *High supersaturation in the wake of hydrometeors: Implications for secondary ice nucleation and cloud invigoration (6 min)*
- **Bill Gustafson**, *Improving Understanding of Deep Convection Life Cycle using LASSO-CACTI (6 min)*
- **Guang Zhang**, *Aerosol-convection interaction in GCMs (6 min)*
- **Lin Lin**, *Improved parameterizations of cloud microphysics and aerosol wet removal processes in deep convection for global climate models (6 min)*
- **DISCUSSIONS (30 min)**

Discussions

- What new ASR aerosol process discoveries/campaigns impact aerosol-cloud interaction representations in models including GCMs?
 - lightning, dynamical feed backs (stability/cold pools), aerosol scavenging (wet), aerosol invigoration (wet/dry), ice/warm lofting, self-lofting, UT aerosols, cirrus clouds, stratospheric-tropospheric coupling etc.
- How do aerosols affect deep convection and vice versa (e.g. dry and wet)?
- How to constrain deep convection processes using LES models and data?
- How to evaluate E3SM deep convection treatments with SCREAM/EAGLES?
- How to develop scale aware parameterizations for high-resolution E3SM that capture processes elucidated by ARM/ASR data by harnessing ML?